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A NEW SUBSPECIES OF
GONEPTERYX AMINTHA (PIERIDAE)

FROM YUNNAN, MAINLAND CHINA,
WITH COMPARATIVE NOTES

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MURAYAMA AND SHIMONOYA (1962) PUBLISHED a black and white figure without description of an unusual specimen of *Gonepteryx amintha* Blanchard. On request the first of these authors sent me the figured and one additional specimens for more detailed study. Visible characters and those resulting from the study of the wing pattern of these specimens by photography with ultraviolet light disclosed that these specimens belonged to a new, distinct taxon. These observations were later supported when in 1969 I received a large shipment on loan from the Staatliches Museum für Tierkunde in Dresden (D. D. R.), including seven male specimens of the same form from the same locality. All nine male specimens serve as the type-series of a new subspecies described below:

***Gonepteryx amintha murayamae* Nekrutenko, n. ssp.**

Male: Upperside of forewing a vivid orange color, more intense than in *G. a. amintha* and *G. a. formosana* Fruhstorfer, but rather approximating *G. a. thibetana* Nekrutenko. Discal spot small and hardly recognizable against ground color. Hindwing with orange-lemon ground color, bearing a prominent discal spot. The shape of the hindwing is rounded and slightly dentate (Fig. 1, bottom row).

Hidden wing pattern (Nekrutenko, 1964) characterized by a remarkable reduction of dark elements of both fore- and hindwings (Fig. 2, bottom row). Such a degree of dark element reduction within *G. amintha* is shown only by *G. a. thibetana*.

Length of forewing, base to tip: 29.0-31.6 mm.

Female: Unknown.



Fig. 1.—Subspecies of *Gonepteryx amintha*, upper surfaces. Top left: *G. a. amintha*, ♂, Kunkalashan, Szetschwan (Staatl. Samml. Bayern, Munich). Top center: *G. a. thibetana*, ♂ paratype, Lalung, Pachakshiri, S. E. Tibet, 6.v.1938, Ludlow and Sheriff leg. (Brit. Mus. (N. H.)). Top right: *G. a. formosana*, ♂, "Formosa" (Staatl. Mus. Tierk., Dresden). Central row: females of these subspecies. Bottom center: *G. a. murayamae*, ♂ holotype. Bottom left and right: *G. a. murayamae*, ♂ paratypes.

Holotype male: China mer. occ.: prov. Yunnan occ.: Weihsi, Mekong-Flüss, July (year unknown), 2500 m. (27°13'N, 99°16'E).

Holotype and six paratypes (same data) are deposited in the collection of the Staatliches Museum für Tierkunde, Dresden; 2 paratypes are in the collection of Shû-iti Murayama, Osaka, Japan. All are males.

Comparative notes: The chromaticity characteristics of four subspecies of *G. amintha* are given in Table I in CIE co-ordinates x , y and z for standard source of white light B. Colorimetric data were obtained microscopically by comparison of wing color with standard certified color samples for which spectrophotometric parameters are known. The dominant wavelength of reflected visible light and its purity (P) are shown along with the chromaticity data in Table I.

The new subspecies is remarkable for its extremely high degree of ultraviolet reflection. On the basis of increasingly great surface of reflection of ultraviolet light on the wings, the subspecies of *G. amintha* may be arranged into the following sequence: *amintha-formosana-thibetana-murayamae* (see Fig. 2). Comparison of this sequence with the chromaticity data on Table I shows a regularity common to all members of the genus *Gonepteryx*: the longer the dominant wavelength of reflected visible light, the larger are the ultraviolet reflecting areas. In other words, *orange* brimstone butterflies will always reflect more ultraviolet rays than will yellow or greenish ones.

The named subspecies of *G. amintha* (excluding the present one) are as follows:

- G. amintha amintha* Blanchard, 1871. *Compt.-rend. Acad. Sci. Paris*, 72 (25): 810 (Mou-pin, Thibet).
- G. amintha formosana* Fruhstorfer, 1908. *Entom. Zeits. Stuttgart*, 22 (25): 102 (Taihanriku, Formosa).
- G. amintha limonia* Mell, 1943. "Zoologica", *Orig. Abh. Gesammtgeb. Zool.*, 36 (100): 116 (Nordkuantung, Chekiang, China).
- G. amintha meiyuana* Murayama, 1962. *Tyô To Ga*, 13: 89 (Formosa).
- G. amintha thibetana* Nekrutenko, 1968. Phylogeny and geographical distribution of the genus *Gonepteryx*. Kiev, Naukova Dumka: 77 (Lalung, Pachakshiri, S. E. Tibet).

I am here giving a full translation (from Russian) of the original description of *G. a. thibetana* (Figs. 1 and 2, top center).

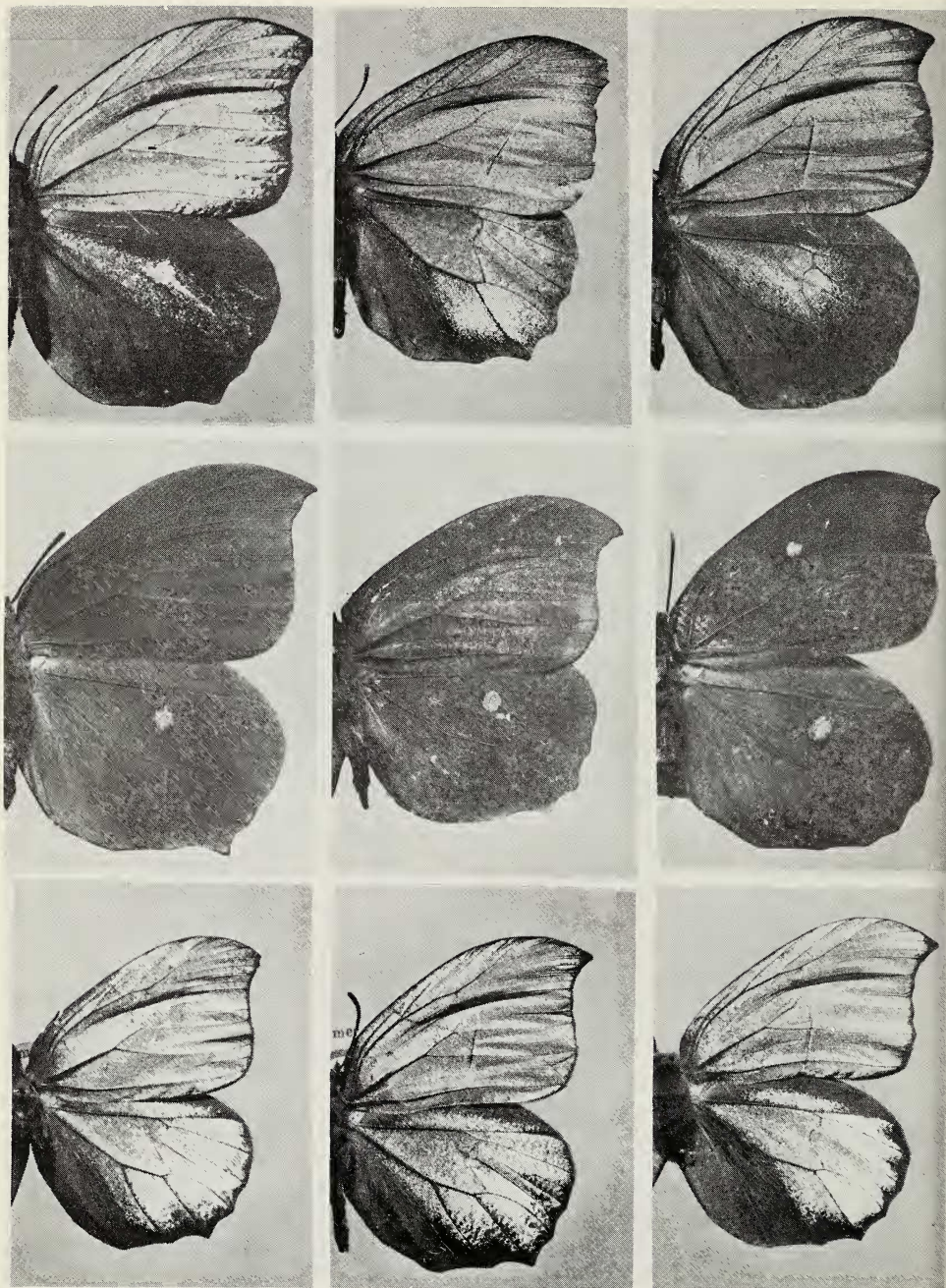


Fig. 2.—Hidden wing-patterns of specimens illustrated in Fig. 1 (right sides only).

CIE COLOR CO-ORDINATES OF FOUR SUBSPECIES OF GONEPTERYX AMINTHA

ssp.	x'	y'	z'	M	x	y	z	WL	P, %
amintha	70.0	67.6	15.2	152.80	0.4581	0.4424	0.0994	570	55
formosana	51.1	50.0	8.2	109.29	0.4675	0.4547	0.0479	576	85
thibetana	67.7	63.2	6.0	136.87	0.4946	0.4617	0.0436	578	75
murayamae	67.7	63.2	6.0	136.87	0.4946	0.4617	0.0436	578	75

Notes: 1. Color co-ordinates are given for the forewing.

2. Wavelength (WL) in millimicrons.

Male: Upper surface of forewing bright orange; toward the wing margins this color becomes lighter, especially between the veins, and approximates the color of the hindwing. Forewing bears a very small (less than 1 mm in diameter) orange discal spot that is almost invisible against the ground color. Costal margin of forewing is very bowed, forming a distinct, backward curved angle.

Hindwing above vivid yellow, as on both wings of *amintha amintha*, bearing a prominent orange discal spot of large size (2-3 mm). Shape of hindwing rounded, wavy: the margin bearing notable cuttings, though it is not dentate as in *G. mahaguru*.

Female: Fore- and hindwing are of similar light, greenish-yellow color. Forewing bears a small, and hindwing a large, orange discal spot; toward the margins the color becomes yellow, as in male hindwing. In shape of the wings the female does not differ from the male.

Expanse of wings: ♂♂ 50-60 mm, ♀♀ 60-65 mm.

The hidden wing pattern of the male is characterized by the narrow *zona opaca marginalis* of the forewing. The bright central spot of the hindwing is variable in size in different specimens: it may occupy nearly the entire surface with the exception of a narrow marginal band, or it may be restricted to only the central part of the wing. In females the hidden wing pattern is absent: on the dark ground tones are the bright discal spots.

Holotype male: S. E. Thibet, Lalung, Pachakshiri, 7000 ft., 6.v.1938, F. Ludlow and G. Sheriff leg. [British Museum (Natural History)].

Allotype female: same label data, 2.v.1938.

Paratypes: 4 ♂♂, 1 ♀, same data, 4-6.v.1938.

Material deposited in the collection of the British Museum (Natural History).

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